§ 430.23 Test procedures for the measurement of energy and water consumption.

When the test procedures of this section call for rounding off of test results, and the results fall equally between two values of the nearest dollar, kilowatt-hour, or other specified nearest value, the result shall be rounded up to the nearest higher value.

(a) *Refrigerators and refrigerator-freezers.* (1) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(2) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(3) The estimated annual operating cost for any other specified cycle type for electric refrigerators and electric refrigerator-freezers shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the specified cycle type, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 to this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(4) The energy factor for electric refrigerators and electric refrigerator-freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be:

(i) For electric refrigerators and electric refrigerator-freezers without an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart before appendix A becomes mandatory and 6.1 of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A), divided by—

(B) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A), the resulting quotient then being rounded off to the second decimal place; and

(ii) For electric refrigerators and electric refrigerator-freezers having an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart before appendix A becomes mandatory and 6.1 of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A), divided by —

(B) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A), the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of electric refrigerators and electric refrigerator-freezers, expressed in kilowatt-hours per year, shall be the following, rounded to the nearest kilowatt-hour per year:

(i) For electric refrigerators and electric refrigerator-freezers without an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A), and

(ii) For electric refrigerators and electric refrigerator-freezers having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 (6.3.6 for externally vented units) of appendix A1 of this subpart before appendix A becomes mandatory and 6.2 (6.3.6 for externally vented units) of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A).

(6) Other useful measures of energy consumption for electric refrigerators and electric refrigerator-freezers shall be those measures of energy consumption for electric refrigerators and electric refrigerator-freezers that the Secretary determines are likely to assist consumers in making purchasing decisions which are derived from the application of appendix A1 of this subpart before appendix A becomes mandatory appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A).

(7) The estimated regional annual operating cost for externally vented electric refrigerators and externally vented electric refrigerator-freezers without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year,

(ii) The regional average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart before appendix A becomes mandatory and 6.3.7 of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(8) The estimated regional annual operating cost for externally vented electric refrigerators and externally vented electric refrigerator-freezers with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the regional average per-cycle energy consumption for a test cycle with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart before appendix A becomes mandatory and 6.3.7 of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(9) The estimated regional annual operating cost for any other specified cycle for externally vented electric refrigerators and externally vented electric refrigerator-freezers shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The regional average per-cycle energy consumption for the specified cycle, in kilowatt-hours per cycle, determined according to 6.3.7 of appendix A1 of this subpart before appendix A becomes mandatory and 6.3.7 of appendix A of this subpart after appendix A becomes mandatory (see the note at the beginning of appendix A); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(10) The following principles of interpretation should be applied to the test procedure. The intent of the energy test procedure is to simulate typical room conditions (approximately 70 °F (21 °C)) with door openings, by testing at 90 °F (32.2 °C) without door openings. Except for operating characteristics that are affected by ambient temperature (for example, compressor percent run time), the unit, when tested under this test procedure, shall operate in a manner equivalent to the unit in typical room conditions. The energy used by the unit shall be calculated when a calculation is provided by the test procedure. Energy consuming components that operate in typical room conditions (including as a result of door openings, or a function of humidity), and that are not exempted by this test procedure, shall operate in an equivalent manner during energy testing under this test procedure, or be accounted for by all calculations as provided for in the test procedure. If:

(i) A product contains energy consuming components that operate differently during the prescribed testing than they would during representative average consumer use and

(ii) Applying the prescribed test to that product would evaluate it in a manner that is unrepresentative of its true energy consumption (thereby providing materially inaccurate comparative data), a manufacturer must obtain a waiver in accordance with the relevant provisions of 10 CFR part 430. Examples:

A. Energy saving features that are designed to be activated by a lack of door openings shall not be functional during the energy test.

B. The defrost heater should not either function or turn off differently during the energy test than it would when operating in typical room conditions.

C. Electric heaters that would normally operate at typical room conditions with door openings should also operate during the energy test.

D. Energy used during adaptive defrost shall continue to be tested and adjusted per the calculation provided for in this test procedure.

(b) *Freezers.* (1) The estimated annual operating cost for freezers without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(2) The estimated annual operating cost for freezers with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(3) The estimated annual operating cost for any other specified cycle type for freezers shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the specified cycle type, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B); and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(4) The energy factor for freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be:

(i) For freezers not having an anti-sweat heater switch, the quotient of:

(A) The adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart before appendix B becomes mandatory and 6.1 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B), divided by—

(B) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B), the resulting quotient then being rounded off to the second decimal place; and

(ii) For freezers having an anti-sweat heater switch, the quotient of:

(A) The adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart before appendix B becomes mandatory and 6.1 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B), divided by—

(B) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B), the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of all freezers, expressed in kilowatt-hours per year, shall be the following, rounded to the nearest kilowatt-hour per year:

(i) For freezers not having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B), and

(ii) For freezers having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart before appendix B becomes mandatory and 6.2 of appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B).

(6) Other useful measures of energy consumption for freezers shall be those measures the Secretary determines are likely to assist consumers in making purchasing decisions and are derived from the application of appendix B1 of this subpart before appendix B becomes mandatory and appendix B of this subpart after appendix B becomes mandatory (see the note at the beginning of appendix B).

(7) The following principles of interpretation should be applied to the test procedure. The intent of the energy test procedure is to simulate typical room conditions (approximately 70 °F (21 °C)) with door openings, by testing at 90 °F (32.2 °C) without door openings. Except for operating characteristics that are affected by ambient temperature (for example, compressor percent run time), the unit, when tested under this test procedure, shall operate in a manner equivalent to the unit in typical room conditions. The energy used by the unit shall be calculated when a calculation is provided by the test procedure. Energy consuming components that operate in typical room conditions (including as a result of door openings, or a function of humidity), and that are not exempted by this test procedure, shall operate in an equivalent manner during energy testing under this test procedure, or be accounted for by all calculations as provided for in the test procedure. If:

(i) A product contains energy consuming components that operate differently during the prescribed testing than they would during representative average consumer use and

(ii) Applying the prescribed test to that product would evaluate it in a manner that is unrepresentative of its true energy consumption (thereby providing materially inaccurate comparative data), a manufacturer must obtain a waiver in accordance with the relevant provisions of 10 CFR part 430. Examples:

A. Energy saving features that are designed to be activated by a lack of door openings hall not be functional during the energy test.

B. The defrost heater should not either function or turn off differently during the energy test than it would when in typical room conditions.

C. Electric heaters that would normally operate at typical room conditions with door openings should also operate during the energy test.

D. Energy used during adaptive defrost shall continue to be tested and adjusted per the calculation provided for in this test procedure.

(c) *Dishwashers.* (1) The Estimated Annual Operating Cost (EAOC) for dishwashers must be rounded to the nearest dollar per year and is defined as follows:

(i) When cold water (50 °F) is used,

(A) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart, EAOC = $(D_e \times S) + (D_e \times N \times (M - (E_D/2)))$.

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this subpart, EAOC = $(D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F - (E_D/2)))$.

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle, EAOC = $(D_e \times S) + (D_e \times N \times M)$.

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle, EAOC = $(D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F))$.

Where,

D_e = the representative average unit cost of electrical energy, in dollars per kilowatt-hour, as provided by the Secretary,

S = the estimated annual standby energy consumption in kilowatt-hours per year and determined according to section 5.6 of appendix C to this subpart,

E_{TLP} = the annual combined low-power mode energy consumption in kilowatt-hours per year and determined according to section 5.7 of appendix C1 to this subpart,

N = the representative average dishwasher use of 215 cycles per year,

M = the machine energy consumption per cycle for the normal cycle, as defined in section 1.6 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); the normal cycle is defined in section 1.12 of appendix C1 to this subpart, and the machine energy consumption per cycle in kilowatt-hours must be determined according to section 5.1.1 of appendix C1 to this subpart for non-soil-sensing dishwashers and section 5.1.2 of appendix C1 to this subpart for soil-sensing dishwashers when using appendix C1 (see the note at the beginning of appendix C1),

M_{WS} = the machine energy consumption per cycle for water softener regeneration, in kilowatt-hours and determined according to section 5.1.3 of appendix C1 to this subpart,

E_F = the fan-only mode energy consumption per cycle, in kilowatt-hours and determined according to section 5.2 of appendix C1 to this subpart, and

E_D = the drying energy consumption, in kilowatt-hours and defined as energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle; E_D is determined according to section 5.2 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C), and determined according to section 5.3 of appendix C1 to this subpart when using appendix C1 (see the note at the beginning of appendix C1),

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(A) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(i)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

(ii) When electrically-heated water (120 °F or 140 °F) is used,

(A) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart, EAOC = $(D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_e \times N \times W)$.

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this subpart, EAOC = $(D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F - (E_D/2))) + (D_e \times N \times (W + W_{WS}))$.

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle, EAOC = $(D_e \times S) + (D_e \times N \times M) + (D_e \times N \times W)$.

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle, EAOC = $(D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F)) + (D_e \times N \times (W + W_{WS}))$.

Where,

D_e, S, E_{TLP}, N, M, M_{WS}, E_F, and E_D, are defined in paragraph (c)(1)(i) of this section,

W = the water energy consumption per cycle for the normal cycle as defined in section 1.6 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.4 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); when using appendix C1 (see the note at the beginning of appendix C1), the normal cycle is as defined in section 1.12 of appendix C1 to this subpart, and the water energy consumption per cycle in kilowatt-hours is determined according to section 5.5.1.1 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.5.2.1 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F, and

W_{WS} = the water softener regeneration water energy consumption per cycle in kilowatt-hours and determined according to section 5.5.1.2 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.5.2.2 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F.

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(A) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(ii)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

(iii) When gas-heated or oil-heated water is used,

(A) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart, $EAOC_g = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_g \times N \times W_g)$.

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this subpart, $EAOC_g = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F - (E_D/2))) + (D_g \times N \times (W_g + W_{WSg}))$.

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle, $EAOC_g = (D_e \times S) + (D_e \times N \times M) + (D_g \times N \times W_g)$.

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle, $EAOC_g = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F)) + (D_g \times N \times (W_g + W_{WSg}))$.

Where,

D_e, S, E_{TLP}, N, M, M_{WS}, E_F, and E_D are defined in paragraph (c)(1)(i) of this section,

D_g = the representative average unit cost of gas or oil, as appropriate, in dollars per Btu, as provided by the Secretary,

W_g = the water energy consumption per cycle for the normal cycle as defined in section 1.6 of appendix C to this subpart, in Btus and determined according to section 5.5 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); when using appendix C1 (see the note at the beginning of appendix C1), the normal cycle is as defined in section 1.12 of appendix C1 to this subpart, and the water energy consumption per cycle in Btus is determined according to section 5.6.1.1 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.6.2.1 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F and

W_{WSg} = the water softener regeneration energy consumption per cycle in Btu per cycle and determined according to section 5.6.1.2 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.6.2.2 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F.

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(A) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(iii)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

(2) The estimated annual energy use, EAEU, expressed in kilowatt-hours per year must be rounded to the nearest kilowatt-hour per year and is defined as follows:

(i) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart and when using appendix C1 (see the note at the beginning of appendix C), as defined in section 1.22 of appendix C1 to this subpart,

(A) $EAEU = (M - (E_D/2) + W) \times N + S$ may be used for units manufactured:

(*1*) Before April 29, 2013 to make representations of energy efficiency; and

(*2*) Before the compliance date of any amended standards to demonstrate compliance.

(B) $EAEU = (M + M_{WS} + E_F - (E_D/2) + W + W_{WS}) \times N + (E_{TLP})$ must be used for units manufactured:

(*1*) On or after April 29, 2013 to make representations of energy efficiency; and

(*2*) On or after the compliance date of any amended standards to demonstrate compliance.

Where,

M, M_{WS}, S, E_D, N, E_F, and E_{TLP} are defined in paragraph (c)(1)(i) of this section, and W and W_{WS}, are defined in paragraph (c)(1)(ii) of this section.

(C) Manufacturers calculating EAEU pursuant to paragraph (c)(2)(i)(A) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(A), (c)(1)(ii)(A), or (c)(1)(iii)(A) of this section, as appropriate. Manufacturers calculating EAEU pursuant to paragraph (c)(2)(i)(B) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(B), (c)(1)(ii)(B), or (c)(1)(iii)(B) of this section, as appropriate.

(ii) For dishwashers not having a truncated normal cycle:

(A) EAEU = (M + W) × N + S may be used for units manufactured:

(*1*) Before April 29, 2013 to make representations of energy efficiency; and

(*2*) Before the compliance date of any amended standards to demonstrate compliance.

(B) EAEU = (M + M_{WS} + E_F + W + W_{WS}) × N + E_{TLP} must be used for units manufactured:

(*1*) On or after April 29, 2013 to make representations of energy efficiency; and

(*2*) On or after the compliance date of any amended standards to demonstrate compliance.

Where,

M, M_{WS}, S, N, E_F, and E_{TLP} are defined in paragraph (c)(1)(i) of this section, and W and W_{WS} are defined in paragraph (c)(1)(ii) of this section.

(C) Manufacturers calculating EAEU pursuant to paragraph (c)(2)(ii)(A) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(C), (c)(1)(ii)(C), or (c)(1)(iii)(C) of this section, as appropriate. Manufacturers calculating EAEU pursuant to paragraph (c)(2)(ii)(B) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(D), (c)(1)(ii)(D), or (c)(1)(iii)(D) of this section, as appropriate.

(3) When using appendix C (see the note at the beginning of appendix C), the water consumption, V, expressed in gallons per cycle and defined in section 5.3 of appendix C to this subpart, and when using appendix C1 (see the note at the beginning of appendix C1), water consumption, V, and the sum of the water consumption, V, and the water consumption during water softener regeneration, V_{WS}, expressed in gallons per cycle and defined in section 5.4 of appendix C1 to this subpart, must be rounded to one decimal place.

(i) Water consumption, V, may be measured for units manufactured:

(A) Before April 29, 2013 to make representations of energy efficiency; and

(B) Before the compliance date of any amended standards to demonstrate compliance.

(ii) Manufacturers calculating water consumption pursuant to paragraph (c)(3)(i) of this section should calculate EAOC as described in paragraph (c)(1)(i)(A), (c)(1)(i)(C), (c)(1)(ii)(A), (c)(1)(ii)(C), (c)(1)(iii)(A), or (c)(1)(iii)(C) of this section, as appropriate. Manufacturers calculating water consumption pursuant to paragraph (c)(3)(i) of this section should calculate EAEU as described in paragraph (c)(2)(i)(A) or (c)(2)(ii)(A) of this section, as appropriate.

(iii) The sum of the water consumption, V, and the water consumption during water softener regeneration, V_{WS}, must be measured for units manufactured:

(A) On or after April 29, 2013 to make representations of energy efficiency; and

(B) On or after the compliance date of any amended standards to demonstrate compliance.

(C) Manufacturers calculating water consumption pursuant to paragraph (c)(3)(iii) of this section should calculate EAOC as described in paragraph (c)(1)(i)(B), (c)(1)(i)(D), (c)(1)(ii)(B), (c)(1)(ii)(D), (c)(1)(iii)(B), or (c)(1)(iii)(D) of this section, as appropriate. Manufacturers calculating water consumption pursuant to paragraph (c)(3)(iii) of this section should calculate EAEU as described in paragraph (c)(2)(i)(B) or (c)(2)(ii)(B) of this section, as appropriate.

(4) Other useful measures of energy consumption for dishwashers are those which the Secretary determines are

likely to assist consumers in making purchasing decisions and which are derived from the application of appendix C and appendix C1 to this subpart.

(d) *Clothes dryers.* (1) The estimated annual operating cost for clothes dryers shall be—

(i) For an electric clothes dryer, the product of the following three factors:

(A) The representative average-use cycle of 283 cycles per year,

(B) The per-cycle combined total energy consumption in kilowatt-hours per-cycle, determined according to 4.6 of appendix D1 to this subpart, and

(C) The representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) For a gas clothes dryer, the product of the representative average-use cycle of 283 cycles per year times the sum of:

(A) The product of the per-cycle gas dryer electric energy consumption in kilowatt-hours per cycle, determined according to 4.2 of appendix D1 to this subpart, times the representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary plus,

(B) The product of the per-cycle gas dryer gas energy consumption, in Btus per cycle, determined according to 4.3 of appendix D1 to this subpart, times the representative average unit cost for natural gas or propane, as appropriate, in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year plus,

(C) The product of the per-cycle standby mode and off mode energy consumption in kilowatt-hours per cycle, determined according to 4.5 of appendix D1 to this subpart, times the representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary.

(2) The energy factor, expressed in pounds of clothes per kilowatt-hour, for clothes dryers shall be either the quotient of a 3-pound bone-dry test load for compact dryers, as defined by 2.7.1 of appendix D to this subpart before the date that appendix D1 becomes mandatory, or the quotient of a 7-pound bone-dry test load for standard dryers, as defined by 2.7.2 of appendix D to this subpart before the date that appendix D1 becomes mandatory, as applicable, divided by the clothes dryer energy consumption per cycle, as determined according to 4.1 for electric clothes dryers and 4.6 for gas clothes dryers of appendix D to this subpart before the date that appendix D1 becomes mandatory, the resulting quotient then being rounded off to the nearest hundredth (.01). Upon the date that appendix D1 to this subpart becomes mandatory, the energy factor is determined in accordance with 4.7 of appendix D1, the result then being rounded off to the nearest hundredth (.01).

(3) Upon the date that appendix D1 to this subpart becomes mandatory, the combined energy factor is determined in accordance with 4.8 of appendix D1, the result then being rounded off to the nearest hundredth (.01).

(4) Other useful measures of energy consumption for clothes dryers shall be those measures of energy consumption for clothes dryers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix D to this subpart before the date that appendix D1 becomes mandatory and appendix D1 upon the date that appendix D1 to this subpart becomes mandatory.

(e) *Water Heaters.* (1) The estimated annual operating cost for water heaters shall be—

(i) For a gas or oil water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of gas or oil, as appropriate, in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(ii) For an electric water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, divided by 3412 Btu per kilowatt-hour, the resulting quotient then

being rounded off to the nearest dollar per year.

(2) The energy factor for the water heaters shall be—

(i) For a gas or oil water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(ii) For an electric water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(3) Other useful measures of energy consumption for water heaters shall be those measures of energy consumption for water heaters which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix E of this subpart.

(4) The alternative uniform test method for measuring the energy consumption of untested water heaters shall be that set forth in section 7.0 of appendix E of this subpart.

(f) *Room air conditioners.* (1) The estimated annual operating cost for room air conditioners, expressed in dollars per year, shall be determined by multiplying the following three factors:

(i) The combined annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, as determined in accordance with paragraph (f)(4) of this section, and

(ii) A representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy efficiency ratio for room air conditioners, expressed in Btus per watt-hour, shall be the quotient of:

(i) The cooling capacity in Btus per hour as determined in accordance with 5.1 of appendix F to this subpart divided by:

(ii) The electrical input power in watts as determined in accordance with 5.2 of appendix F to this subpart, the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

(3) The average annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be determined by multiplying together the following two factors:

(i) Electrical input power in kilowatts as determined in accordance with 5.2 of appendix F to this subpart, and

(ii) The representative average-use cycle of 750 hours of compressor operation per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(4) The combined annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be the sum of:

(i) The average annual energy consumption as determined in accordance with paragraph (f)(4) of this section, and

(ii) The standby mode and off mode energy consumption, as determined in accordance with 5.3 of appendix F to this subpart, the resulting sum then being rounded off to the nearest kilowatt-hour per year.

(5) The combined energy efficiency ratio for room air conditioners, expressed in Btu's per watt-hour, shall be the quotient of:

(i) The cooling capacity in Btus per hour as determined in accordance with 5.1 of appendix F to this subpart multiplied by the representative average-use cycle of 750 hours of compressor operation per year, divided by

(ii) The combined annual energy consumption as determined in accordance with paragraph (f)(4) of this section multiplied by a conversion factor of 1,000 to convert kilowatt-hours to watt-hours, the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

(g) *Unvented home heating equipment.* (1) The estimated annual operating cost for primary electric heaters, shall be the product of: (i) The average annual electric energy consumption in kilowatt-hours per year, determined according to section 3.1 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated regional annual operating cost for primary electric heaters, shall be the product of: (i) The regional annual electric energy consumption in kilowatt-hours per year for primary heaters determined according to section 3.2 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated operating cost per million Btu output shall be—

(i) For primary and supplementary electric heaters and unvented gas and oil heaters without an auxiliary electric system, the product of: (A) One million; and (B) the representative unit cost in dollars per Btu for natural gas, propane, or oil, as provided pursuant to section 323(b)(2) of the Act as appropriate, or the quotient of the representative unit cost in dollars per kilowatt-hour, as provided pursuant to section 323(b)(2) of the Act, divided by 3,412 Btu per kilowatt hour, the resulting product then being rounded off to the nearest 0.01 dollar per million Btu output; and

(ii) For unvented gas and oil heaters with an auxiliary electric system, the product of: (A) The quotient of one million divided by the rated output in Btu's per hour as determined in 3.4 of appendix G of this subpart; and (B) the sum of: (*1*) The product of the maximum fuel input in Btu's per hour as determined in 2.2. of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (*2*) the product of the maximum auxiliary electric power in kilowatts as determined in 2.1 of appendix G of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) The rated output for unvented heaters is the rated output as determined according to either sections 3.3 or 3.4 of appendix G of this subpart, as appropriate, with the result being rounded to the nearest 100 Btu per hour.

(5) Other useful measures of energy consumption for unvented home heating equipment shall be those measures of energy consumption for unvented home heating equipment which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix G of this subpart.

(h) [Reserved]

(i) *Kitchen ranges and ovens.* (1) The estimated annual operating cost for conventional ranges, conventional cooking tops, and conventional ovens shall be the sum of the following products:

(i) The total integrated annual electrical energy consumption for any electrical energy usage, in kilowatt-hours (kWhs) per year, times the representative average unit cost for electricity, in dollars per kWh, as provided pursuant to section 323(b)(2) of the Act; plus

(ii) The total annual gas energy consumption for any natural gas usage, in British thermal units (Btus) per year, times the representative average unit cost for natural gas, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act; plus

(iii) The total annual gas energy consumption for any propane usage, in Btus per year, times the representative average unit cost for propane, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act. The total annual energy consumption for conventional ranges, conventional cooking tops, and conventional ovens shall be as determined according to sections 4.3, 4.2.2, and 4.1.2, respectively, of appendix I to this subpart. For conventional gas cooking tops, total integrated annual electrical energy consumption shall be equal to E_{CTSO}, defined in section 4.2.2.2.4 of appendix I to this subpart. The estimated annual operating cost shall be rounded off to the nearest dollar per year.

(2) The cooking efficiency for conventional cooking tops and conventional ovens shall be the ratio of the cooking energy output for the test to the cooking energy input for the test, as determined according to sections 4.2.1 and 4.1.3, respectively, of appendix I to this

subpart. The final cooking efficiency values shall be rounded off to three significant digits.

(3) [Reserved]

(4) The energy factor for conventional ranges, conventional cooking tops, and conventional ovens shall be the ratio of the annual useful cooking energy output to the total annual energy input, as determined according to sections 4.3, 4.2.3.1, and 4.1.4.1, respectively, of appendix I to this subpart. The final energy factor values shall be rounded off to three significant digits.

(5) The integrated energy factor for conventional ranges, conventional cooking tops, and conventional ovens shall be the ratio of the annual useful cooking energy output to the total integrated annual energy input, as determined according to sections 4.3, 4.2.3.2, and 4.1.4.2, respectively, of appendix I to this subpart. The final integrated energy factor values shall be rounded off to three significant digits.

(6) There shall be two estimated annual operating costs, two cooking efficiencies, and two energy factors for convertible cooking appliances—

(i) An estimated annual operating cost, a cooking efficiency, and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with natural gas; and

(ii) An estimated annual operating cost, a cooking efficiency, and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with LP-gas.

(7) There shall be two integrated energy factors for convertible cooking appliances—

(i) An integrated energy factor which represents the value for this measure of energy consumption for the operation of the appliance with natural gas; and

(ii) An integrated energy factor which represents the value for this measure of energy consumption for the operation of the appliance with LP-gas.

(8) The estimated annual operating cost for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(1) of this section using the total annual gas energy consumption for natural gas times the representative average unit cost for natural gas.

(9) The estimated annual operating cost for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(1) of this section using the representative average unit cost for propane times the total annual energy consumption of the test gas, either propane or natural gas.

(10) The cooking efficiency for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(2) of this section when the appliance is tested with natural gas.

(11) The cooking efficiency for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(2) of this section, when the appliance is tested with either natural gas or propane.

(12) The energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with natural gas.

(13) The integrated energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(7)(i) of this section, shall be determined according to paragraph (i)(5) of this section when the appliance is tested with natural gas.

(14) The energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with either natural gas or propane.

(15) The integrated energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(7)(ii) of this section,

shall be determined according to paragraph (i)(5) of this section when the appliance is tested with natural gas or propane.

(16) Other useful measures of energy consumption for conventional ranges, conventional cooking tops, and conventional ovens shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix I to this subpart.

(j) *Clothes washers.* (1) The estimated annual operating cost for automatic and semi-automatic clothes washers must be rounded off to the nearest dollar per year and is defined as follows:

(i) When using appendix J1 (see the note at the beginning of appendix J1),

(A) When electrically heated water is used,

$$(N_1 \times E_{TE1} \times C_{KWH})$$

Where:

N_1 = the representative average residential clothes washer use of 392 cycles per year according to appendix J1,

E_{TE1} = the total per-cycle energy consumption when electrically heated water is used, in kilowatt-hours per cycle, determined according to section 4.1.7 of appendix J1, and

C_{KWH} = the representative average unit cost, in dollars per kilowatt-hour, as provided by the Secretary.

(B) When gas-heated or oil-heated water is used,

$$(N_1 \times ((ME_{T1} \times C_{KWH}) + (HE_{TG1} \times C_{BTU})))$$

Where:

N_1 and C_{KWH} are defined in paragraph (j)(1)(i)(A) of this section,

ME_{T1} = the total weighted per-cycle machine electrical energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.6 of appendix J1,

HE_{TG1} = the total per-cycle hot water energy consumption using gas-heated or oil-heated water, in Btu per cycle, determined according to section 4.1.4 of appendix J1, and

C_{BTU} = the representative average unit cost, in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary.

(ii) When using appendix J2 (see the note at the beginning of appendix J2),

(A) When electrically heated water is used,

$$(N_2 \times (E_{TE2} + E_{TSO}) \times C_{KWH})$$

Where:

N_2 = the representative average residential clothes washer use of 295 cycles per year according to appendix J2,

E_{TE2} = the total per-cycle energy consumption when electrically heated water is used, in kilowatt-hours per cycle, determined according to section 4.1.7 of appendix J2,

E_{TSO} = the per-cycle combined low-power mode energy consumption, in kilowatt-hours per cycle, determined according to section 4.4 of appendix J2, and

C_{KWH} = the representative average unit cost, in dollars per kilowatt-hour, as provided by the Secretary.

(B) When gas-heated or oil-heated water is used,

$$(N_2 \times ((ME_{T2} + E_{TSO}) \times C_{KWH}) + (HE_{TG2} \times C_{BTU}))$$

Where:

N_2 and E_{TSO} are defined in (j)(1)(ii)(A) of this section,

ME_{T2} = the total weighted per-cycle machine electrical energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.6 of appendix J2,

C_{KWH} = the representative average unit cost, in dollars per kilowatt-hour, as provided by the Secretary,

HE_{TG2} = the total per-cycle hot water energy consumption using gas-heated or oil-heated water, in Btu per cycle, determined according to section 4.1.4 of appendix J2,

C_{BTU} = the representative average unit cost, in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary.

(2)(i) The modified energy factor for automatic and semi-automatic clothes washers is determined according to section 4.4 of appendix J1 (when using appendix J1) and section 4.5 of appendix J2 (when using appendix J2). The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hour per cycle.

(ii) The integrated modified energy factor for automatic and semi-automatic clothes washers is determined according to section 4.6 of appendix J2 (when using appendix J2). The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hour per cycle.

(3) Other useful measures of energy consumption for automatic or semi-automatic clothes washers shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix

J1 or appendix J2, as appropriate. In addition, the annual water consumption of a clothes washer can be determined as:

(i) When using appendix J1, the product of the representative average-use of 392 cycles per year and the total weighted per-cycle water consumption in gallons per cycle determined according to section 4.2.2 of appendix J1. The water factor can be determined according to section 4.2.3 of appendix J1, with the result rounded off to the nearest 0.1 gallons per cycle per cubic foot. The remaining moisture content can be determined according to section 3.8 of appendix J1, with the result rounded off to the nearest 0.1 percent.

(ii) When using appendix J2, the product of the representative average-use of 295 cycles per year and the total weighted per-cycle water consumption for all wash cycles, in gallons per cycle, determined according to section 4.2.11 of appendix J2. The water factor can be determined according to section 4.2.12 of appendix J2, with the result rounded off to the nearest 0.1 gallons per cycle per cubic foot. The integrated water factor can be determined according to section 4.2.13 of appendix J2, with the result rounded off to the nearest 0.1 gallons per cycle per cubic foot. The remaining moisture content can be determined according to section 3.8 of appendix J2, with the result rounded off to the nearest 0.1 percent.

(k)–(l) [Reserved]

(m) *Central Air Conditioners and heat pumps.* (1) The estimated annual operating cost for cooling-only units and air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of:

(A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (A or A_2 Test), as described in section 3.2 of appendix M to this subpart, divided by the seasonal energy efficiency ratio (SEER), in Btu's per watt-hour, determined from section 4.1 of appendix M to this subpart;

(B) The representative average use cycle for cooling of 1,000 hours per year;

(C) A conversion factor of 0.001 kilowatt per watt; and

(D) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of:

(A) The quotient of the standardized design heating requirement, in Btu's per hour, nearest to the heating Region IV minimum design heating requirement, determined in section 4.2 of appendix M to this subpart, divided by the heating seasonal performance factor (HSPF), in Btu's per watt-hour, calculated for heating Region IV corresponding to the above-mentioned standardized design heating requirement and determined in section 4.2 of appendix M to this subpart;

(B) The representative average use cycle for heating of 2,080 hours per year;

(C) The adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system;

(D) A conversion factor of 0.001 kilowatt per watt; and

(E) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(iii) For air-source heat pumps which provide both heating and cooling, the estimated annual operating cost is the sum of the quantity determined in paragraph (m)(1)(i) of this section added to the quantity determined in paragraph (m)(1)(ii) of this section.

(2) The estimated regional annual operating cost for cooling-only units and for air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated regional

annual operating cost for air-source heat pumps which provide both heating and cooling, the product of:

(A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (A or A_2 Test), as described in section 3.2 of appendix M to this subpart, divided by the seasonal energy efficiency ratio (SEER), in Btu's per watt-hour, determined from section 4.1 of appendix M to this subpart;

(B) The estimated number of regional cooling load hours per year determined from Figure 3 in section 4.3 of appendix M to this subpart;

(C) A conversion factor of 0.001 kilowatts per watt; and

(D) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated regional annual operating cost for air-source heat pumps which provide both heating and cooling, the product of:

(A) The estimated number of regional heating load hours per year determined from Figure 2 in section 4.3 of appendix M to this subpart;

(B) The quotient of the standardized design heating requirement, in Btu's per hour, for the appropriate generalized climatic region of interest (*i.e.*, corresponding to the regional heating load hours from ''A'') and determined in section 4.2 of appendix M to this subpart, divided by the heating seasonal performance factor (HSPF), in Btu's per watt-hour, calculated for the appropriate generalized climatic region of interest and corresponding to the above-mentioned standardized design heating requirement while being determined in section 4.2 of appendix M to this subpart;

(C) The adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system;

(D) A conversion factor of 0.001 kilowatts per watt; and

(E) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(iii) For air-source heat pumps which provide both heating and cooling, the estimated regional annual operating cost is the sum of the quantity determined in paragraph (m)(3)(i) of this section added to the quantity determined in paragraph (m)(3)(ii) of this section.

(3) The measure(s) of efficiency of performance for cooling-only units and air-source heat pumps shall be one or more of the following:

(i) The cooling mode efficiency measure for cooling-only units and air-source heat pumps which provide cooling shall be the seasonal energy efficiency ratio (SEER), in Btu's per watt-hour, determined according to section 4.1 of appendix M to this subpart, rounded off to the nearest 0.05.

(ii) The heating mode efficiency measure for air-source heat pumps shall be the heating seasonal performance factors (HSPF), in Btu's per watt-hour, determined according to section 4.2 of appendix M to this subpart for each applicable standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(iii) The annual efficiency measure for air-source heat pumps which provide heating and cooling, shall be the annual performance factors (APF), in Btu's per watt-hour, determined according to section 4.3 of appendix M to this subpart for each standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(4) The average off mode power consumption for central air conditioners and central air conditioning heat pumps shall be determined according to appendix M of this subpart. Round the average off mode power consumption to the nearest watt.

(5) Other useful measures of energy consumption for central air conditioners shall be those measures of energy consumption which the Secretary of Energy determines are likely to assist consumers in making purchasing decisions and which are derived from

the application of appendix M to this subpart.

(6) All measures of energy consumption must be determined by the test method as set forth in appendix M to this subpart; or by an alternative rating method set forth in § 430.24(m)(4) as approved by the Assistant Secretary for Energy Efficiency and Renewable Energy in accordance with § 430.24(m)(5).

(n) *Furnaces.* (1) The estimated annual operating cost for furnaces is the sum of: (i) The product of the average annual fuel energy consumption, in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 10.2.2 or 10.3 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 10.2.3 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year. (For furnaces which operate with variable inputs, an estimated annual operating cost is to be calculated for each degree of oversizing specified in section 10 of appendix N of this subpart.)

(2) The annual fuel utilization efficiency for furnaces, expressed in percent, is the ratio of the annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the furnace determined according to section 10.1 of appendix N of this subpart for gas and oil furnaces and determined in accordance with section 11.1 of the American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 103–1993 (incorporated by reference, see § 430.3) for electric furnaces. Round the annual fuel utilization efficiency to the nearest whole percentage point.

(3) The estimated regional annual operating cost for furnaces is the sum of: (i) The product of the regional annual fuel energy consumption in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 10.5.1 or 10.5.3 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the regional annual auxiliary electrical energy consumption in kilowatt-hours per year, determined according to section 10.5.2 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(4) The energy factor for furnaces, expressed in percent, is the ratio of annual fuel output of useful energy delivered to the heated space to the total annual energy input to the furnace determined according to section 10.4 of appendix N of this subpart.

(5) The average standby mode and off mode electrical power consumption for furnaces shall be determined according to section 8.6 of appendix N of this subpart. Round the average standby mode and off mode electrical power consumption to the nearest watt.

(6) Other useful measures of energy consumption for furnaces shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix N of this subpart.

(o) *Vented home heating equipment.* (1) The annual fuel utilization efficiency for vented home heating equipment, expressed in percent, which is the ratio of the annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the vented heater, shall be determined either according to section 4.1.17 of appendix O of this subpart for vented heaters without either manual controls or thermal stack dampers; according to

section 4.2.6 of appendix O of this subpart for vented heaters equipped with manual controls; or according to section 4.3.7 of appendix O of this subpart for vented heaters equipped with thermal stack dampers.

(2) The estimated annual operating cost for vented home heating equipment is the sum of: (i) The product of the average annual fuel energy consumption, in Btu's per year for natural gas, propane, or oil fueled vented home heating equipment, determined according to section 4.6.2 of appendix O of this subpart, and the representative average unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus (ii) The product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 4.6.3 of appendix O of this subpart, and the representative average unit cost in dollars per kilowatt-hours as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(3) The estimated operating cost per million Btu output for gas or oil vented home heating equipment with an auxiliary electric system shall be the product of: (A) The quotient of one million Btu divided by the sum of: (*1*) The product of the maximum fuel input in Btu's per hour as determined in 3.1.1 or 3.1.2 of appendix 0 of this subpart times the annual fuel utilization efficiency in percent as determined in 4.1.17, 4.2.6, or 4.3.7 of this appendix as appropriate divided by 100, plus (*2*) the product of the maximum electric power in watts as determined in 3.1.3 of appendix 0 of this subpart times the quantity 3.412; and (B) of the sum of: (*1*) the product of the maximum fuel input in Btu's per hour as determined in 3.1.1 of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus (*2*) the product of the maximum auxiliary electric power in kilowatts as determined in 3.1.3 of appendix O of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) Other useful measures of energy consumption for vented home heating equipment shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix O of this subpart.

(p) *Pool heaters.* (1) The estimated annual operating cost for pool heaters is the sum of:

(i) The product of the average annual fuel energy consumption, in Btu's per year, of natural gas or oil fueled pool heaters, determined according to section 4.2 of appendix P of this subpart, and the representative average unit cost in dollars per Btu for natural gas or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus

(ii) The product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 4.3 of appendix P of this subpart, and the representative average unit cost in dollars per kilowatt-hours as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(2) The thermal efficiency of pool heaters, expressed as a percent, shall be determined in accordance with section 4 of appendix P to this subpart.

(q) *Fluorescent Lamp Ballasts.* (1) The Estimated Annual Energy Consumption (EAEC) for fluorescent lamp ballasts, expressed in kilowatt-hours per year, shall be the product of:

(i) The input power in kilowatts as determined in accordance with section 3.1.3.1 of appendix Q to this subpart; and

(ii) The representative average use cycle of 1,000 hours per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(2) Ballast Efficacy Factor (BEF) shall be as determined in section 4.2 of appendix Q of this subpart.

(3) The Estimated Annual Operating Cost (EAOC) for fluorescent lamp ballasts, expressed in dollars per year, shall be the product of:

(i) The representative average unit energy cost of electricity in dollars per kilowatt-hour as provided by the Secretary,

(ii) The representative average use cycle of 1,000 hours per year, and

(iii) The input power in kilowatts as determined in accordance with section 3.1.3.1 of appendix Q to this subpart, the resulting product then being rounded off to the nearest dollar per year.

(4) Standby power consumption of certain fluorescent lamp ballasts shall be measured in accordance with section 3.2 of appendix Q to this subpart.

(r) *General service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps.* (1) The estimated annual energy consumption for general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps, expressed in kilowatt-hours per year, shall be the product of the input power in kilowatts as determined in accordance with section 4 of appendix R to this subpart and an average annual use specified by the manufacturer, with the resulting product rounded off to the nearest kilowatt-hour per year. Manufacturers must provide a clear and accurate description of the assumptions used for the estimated annual energy consumption.

(2) The lamp efficacy for general service fluorescent lamps shall be equal to the average lumen output divided by the average lamp wattage as determined in section 4 of appendix R of this subpart, with the resulting quotient rounded off to the nearest tenth of a lumen per watt.

(3) The lamp efficacy for general service incandescent lamps shall be equal to the average lumen output divided by the average lamp wattage as determined in section 4 of appendix R of this subpart, with the resulting quotient rounded off to the nearest tenth of a lumen per watt.

(4) The lamp efficacy for incandescent reflector lamps shall be equal to the average lumen output divided by the average lamp wattage as determined in section 4 of appendix R of this subpart, with the resulting quotient rounded off to the nearest tenth of a lumen per watt.

(5) The color rendering index of a general service fluorescent lamp shall be tested and determined in accordance with section 4.4 of appendix R of this subpart and rounded off to the nearest unit.

(6) The rated lifetime for general service incandescent lamps shall be measured in accordance with test procedures described in section 4.2 of Appendix R of this chapter. A lamp shall be compliant with standards if greater than 50 percent of the sample size specified in § 429.27 meets the minimum rated lifetime as specified by energy conservations standards for general service incandescent lamps.

(s) *Faucets.* The maximum permissible water use allowed for lavatory faucets, lavatory replacement aerators, kitchen faucets, and kitchen replacement aerators, expressed in gallons and liters per minute (gpm and L/min), shall be measured in accordance to section 2(a) of appendix S of this subpart. The maximum permissible water use allowed for metering faucets, expressed in gallons and liters per cycle (gal/cycle and L/cycle), shall be measured in accordance to section 2(a) of appendix S of this subpart.

(t) *Showerheads.* The maximum permissible water use allowed for showerheads, expressed in gallons and liters per minute (gpm and L/min), shall be measured in accordance to section 2(b) of appendix S of this subpart.

(u) *Water closets.* The maximum permissible water use allowed for water closets, expressed in gallons and liters per flush (gpf and Lpf), shall be measured in accordance to section 3(a) of appendix T of this subpart.

(v) *Urinals.* The maximum permissible water use allowed for urinals, expressed in gallons and liters per flush (gpf and Lpf), shall be measured in accordance to section 3(b) of appendix T of this subpart.

(w) *Ceiling fans.* The airflow and airflow efficiency for ceiling fans, expressed in cubic feet per minute (CFM) and CFM per watt (CFM/watt), respectively, shall be measured in accordance with section 4 of appendix U of this subpart.

(x) *Ceiling fan light kits.* The efficacy, expressed in lumens per watt (lumens/watt), for ceiling fan light kits with

sockets for medium screw base lamps or pin-based fluorescent lamps shall be measured in accordance with section 4 of appendix V of this subpart.

(y) *Medium Base Compact Fluorescent Lamps*. The initial efficacy, lumen maintenance at 1,000 hours, lumen maintenance at 40-percent of rated life, rapid cycle stress test, and lamp life shall be measured in accordance with section 4 of appendix W of this subpart.

(z) *Dehumidifiers*. (1) When using appendix X (see the note at the beginning of appendix X), the energy factor for dehumidifiers, expressed in liters per kilowatt hour (L/kWh), shall be measured in accordance with section 4.1 of appendix X of this subpart.

(2) When using appendix X1 (see the note at the beginning of appendix X1), the integrated energy factor for dehumidifiers, expressed in L/kWh, shall be determined according to paragraph 5.2 of appendix X1 to this subpart.

(aa) *Battery Chargers*. Upon the effective date of any energy conservation standard for battery chargers governing active and maintenance mode energy consumption, the 24-hour energy consumption of a battery charger in active and maintenance modes, expressed in watt-hours, and the power consumption of a battery charger in maintenance mode, expressed in watts, shall be measured in accordance with section 5.10 of appendix Y of this subpart. The power consumption of a battery charger in standby mode and off mode, expressed in watts, shall be measured in accordance with sections 5.11 and 5.12, respectively, of appendix Y of this subpart.

(bb) *External Power Supplies*. The energy consumption of an external power supply, including active-mode efficiency expressed as a percentage and the no-load, off, and standby mode energy consumption levels expressed in watts, shall be measured in accordance with section 4 of appendix Z of this subpart.

[42 FR 27898, June 1, 1977]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 430.23, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

EFFECTIVE DATE NOTE: At 77 FR 74571, Dec. 17, 2012, § 430.23 was amended by removing the words ''section 4.2 of appendix P'' in paragraph (p)(1)(i) and adding in their place ''section 5.2 of appendix P''; and by removing the words ''section 4.3 of appendix P'' in paragraph (p)(1)(ii) and adding in their place ''section 5.3 of appendix P'', effective Jan. 16, 2013.

§ 430.24 [Reserved]

§ 430.25 Laboratory Accreditation Program.

Testing for fluorescent lamp ballasts performed in accordance with appendix Q1 to this subpart shall comply with this § 430.25. The testing for general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps shall be performed in accordance with Appendix R to this subpart. The testing for medium base compact fluorescent lamps shall be performed in accordance with Appendix W of this subpart. This testing, with the exception of lifetime testing of general service incandescent lamps, shall be conducted by test laboratories accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) or by an accrediting organization recognized by NVLAP. NVLAP is a program of the National Institute of Standards and Technology, U.S. Department of Commerce. NVLAP standards for accreditation of laboratories that test for compliance with standards for fluorescent lamp ballast luminous efficiency (BLE), lamp efficacy, lamp lifetime, and fluorescent lamp CRI are set forth in 15 CFR part 285. A manufacturer's or importer's own laboratory, if accredited, may conduct the applicable testing. Testing for BLE may also be conducted by laboratories accredited by Underwriters Laboratories or Council of Canada. Testing for fluorescent lamp ballasts performed in accordance with Appendix Q to this subpart is not required to be conducted by test laboratories accredited by NVLAP or an accrediting organization recognized by NVLAP.

[77 FR 4216, Jan. 27, 2012]

§ 430.27 Petitions for waiver and applications for interim waiver.

(a)(1) Any interested person may submit a petition to waive for a particular basic model any requirements of